

National Examinations May 2015
98-Ind-B2-Manufacturing Processes
3 hours duration

Notes:

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.
2. This is a Closed Book exam. Candidates may use one of two calculators, the Casio or Sharp approved models.
3. Any five questions constitute a complete paper. Only the first five questions as they appear in your answer book will be marked.
4. All questions are of equal value.
5. Write your answers in point-form whenever possible, but fully. Show all calculations.

Marking Scheme (marks)

1.	(i) 7,	(ii) 7,	(iii) 6
2.	(i) 7,	(ii) 6,	(iii) 7
3.	(i) 7,	(ii) 7,	(iii) 6
4.	(i) 7,	(ii) 7,	(iii) 6
5.	(i) 6,	(ii) 8,	(iii) 6
6.	(i) 7,	(ii) 7,	(iii) 6
7.	(i) 8,	(ii) 7,	(iii) 5

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1.
 - (i) State the specific characteristics of non-ferrous alloys in general and aluminum, magnesium and copper alloys in particular.
 - (ii) What are the basic advantages of plastics in comparison to metals? State the general characteristics of plastics.
 - (iii) Explain the current trends that are taking place in the development, use and improvements in plastics.

2.
 - (i) State the basic advantages of plastics in comparison to metals. What are the general characteristics of plastics?
 - (ii) Why are additives compounded with polymers/plastics? Name the typical additives generally used.
 - (iii) Explain the specific characteristics of: (1) thermoplastics, (2) thermosets and (3) elastomers/rubbers.

3.
 - (i) What are the different types of metal chips and which one of them is the best?
 - (ii) What is a built-up edge and how does it affect the metal cutting operation? How can it be eliminated or minimized?
 - (iii) In an orthogonal metal cutting operation, the following data are obtained:
Underformed chip thickness = 0.0098 inches
Actual chip thickness = 0.0169 inches
Rake angle = 20°
Determine the shear angle.

4.
 - (i) Explain briefly the factors or parameters that influence the metal cutting processes.
 - (ii) Briefly state your understanding of: (a) tool wear and failure, (b) surface finish and integrity and (c) machinability.
 - (iii) What are the current trends in metal cutting processes?

5.
 - (i) State the factors that should be considered in the selection of a welding process for a particular operation.
 - (ii) Explain the characteristics of the following welding processes including their general chemical expressions or equations, where applicable: (1) oxyacetylene, (2) arc, and (3) resistance.
 - (iii) What is the basic difference between oxyfuel gas cutting and arc cutting? State the different types of arc cutting.

6.
 - (i) State the general characteristics of the following forming and shaping processes: (a) forging, (b) extrusion, and (c) sheet-metal forming.
 - (ii) What are the steps followed in a typical forging operation?
 - (iii) What are the current trends in forging design and manufacturing?

7.
 - (i) State the advantages and limitations of numerically controlled (NC) machines over conventional machines.
 - (ii) State the characteristics of direct numerical control (DNC) and computer numerical control (CNC) machines.
 - (iii) State the advantages of CNC over conventional NC (DNC) machines.